CENTRO STUDI LUCA D'AGLIANO

DEVELOPMENT STUDIES WORKING PAPERS

N. 175

September 2003

GATT – Think with Asymmetric Countries

*Paolo Epifani**

*Juliette Vitaloni***

*University of Parma and CESPRI

**CESPRI

'GATT-Think' with Asymmetric Countries*

Paolo Epifani† Juliette Vitaloni‡

University of Parma and CESPRI CESPRI

March 2003

Abstract

We argue that, in the presence of asymmetric countries, a trade agreement that conforms to GATT's reciprocity rule allows the (stronger) less trade dependent country to improve its welfare relative to both the free trade and the trade war. Conversely, the (weaker) more trade dependent country cannot reach the free trade welfare level under reciprocity, although its welfare improves relative to the trade war. Reciprocity is so unfavorable to the weaker country that it may be worse off under reciprocity than under the Nash bargaining solution, a 'power-based' approach to trade negotiations that reflects power asymmetries among trading partners. Our results question Bagwell and Staiger (1999, 2000)'s view of reciprocity as a rule that "serves to mitigate the influence of power asymmetries on negotiated outcomes".

JEL classification: F02, F13, F15.

Keywords: Reciprocity; Trade negotiations; Trade dependence; Nash bargaining solution.

*We are grateful to Gino Gancia, Giovanni Maggi, Fabrizio Onida and Alessandro Turrini for helpful discussion and advise. The usual caveat applies.

†Università di Parma, via Kennedy, 6 - 43100 Parma (Italy). E-mail: paolo.epifani@unipr.it

‡Università Commerciale L. Bocconi, via Sarfatti, 25 - 20136 Milano (Italy). E-mail: juliette.vitaloni@uni-bocconi.it

1 Introduction

In a series of papers, Bagwell and Staiger[1] have developed a comprehensive economic theory of GATT that allows to evaluate its foundational rules. It is widely accepted that the main pillar of GATT is the rule of reciprocity, which "refers to the 'ideal' of mutual changes in trade policy that bring about equal changes in import volumes across trading partners" (BS99, p.224)[2].[3] An important message of Bagwell and Staiger's work is that "GATT's reciprocity rule serves to mitigate the influence of power asymmetries on negotiated outcomes" (BS00, p.47). More generally, they argue that GATT is an approach to trade negotiations in which decisions are taken with reference to previously agreed rules (a 'rules-based' approach). The natural alternative to GATT is a 'power-based' approach, where agreements are reached, instead, with reference to the relative power status of trading partners and where the negotiated outcome reflects power asymmetries among them.[4] Therefore, GATT's rules, and reciprocity in particular, should favor countries with a low bargaining power relative to their stronger trading partners.

In this paper, we challenge these conclusions with a counter-example. We formulate a standard two-sector, general equilibrium model of trade between two asymmetric countries to show that GATT's reciprocity rule, as formalized by Bagwell and Staiger, may exacerbate, rather than mitigating, power asymmetries among countries. In order to develop our argument, we first compare the negotiated outcome under the GATT's rule of reciprocity with both the free trade and the trade war. We find that in the GATT equilibrium the weaker country (i.e., the country that is

[1] See, in particular, Bagwell and Staiger (1996, 1999, 2000, 2001; henceforth, BSXX). 'GATT-Think' in the title of this paper refers to Bagwell and Staiger's economic theory of GATT. It is also the title of BS00, which refers, in turn, to the ironic label given by Krugman (1991) to the set of principles that govern trade negotiations within the GATT-WTO.

[2] As noted by BS99 (p. 217), although there is no formal requirement that GATT's negotiations conform to the rule of reciprocity, it has been observed that governments seek, *de facto*, a balance of concessions. Further, the principle of reciprocity explicitly governs the manner in which tariffs may be increased in the GATT's procedures for renegotiation. See also Dam (1970) on how reciprocity is measured in practice.

[3] Another pillar of GATT is the principle of non-discrimination, according to which member countries agree that any tariff applied to imports of one trading partner applies also to all other trading partners. The rule of non-discrimination is trivially satisfied in the two-country model analyzed in this paper. BS99 show that in a higher dimensional context, non-discrimination is complementary to reciprocity, since it preserves its effectiveness in a multi-country setting. In particular, they show that an agreement based on reciprocity is 'renegotiation proof' if and only if it also satisfies the rule of non-discrimination.

[4] See also Jackson (1989) on this point.

relatively more trade dependent) improves its welfare relative to the trade war, but cannot reach the free trade welfare level. More strikingly, in the GATT equilibrium the stronger, less trade dependent country improves its welfare relative to both the free trade and the trade war. Our result does not depend on how large are the power asymmetries among countries. As explained below, this means that, independent of whether the stronger country is strong enough to win a trade war, it is always better off in the GATT equilibrium than in free trade.[5]

An interesting corollary of our result is that, although the more trade dependent country is, by definition, the country that gains potentially more from trade liberalization, it is also the one that stops first the liberalization effort along the liberalization path which conforms to reciprocity. In other words, the weaker country is more reluctant than its trading partner to push further the mutual tariff cuts according to reciprocity, and the difference in the two countries' willingness to liberalize is greater the greater are the country asymmetries.

We next compare the negotiated outcome under GATT's rule of reciprocity to the Nash bargaining solution, a power-based approach to trade negotiations whose outcome reflects country asymmetries in power status. Surprisingly, we find that the weaker country is better off under a power-based approach than under GATT's reciprocity rule; conversely, the stronger country is better off under GATT's reciprocity rule than in the Nash bargaining solution, and its preference for reciprocity is greater the greater is the relative trade dependence of its trading partner.

The intuition behind our results is as follows. As shown by BS99, negotiating according to reciprocity means freezing the terms of trade at their pre-existing level. However, since in the non-cooperative Nash equilibrium the terms of trade are unfavorable to the weaker country, it follows that under reciprocity the weaker country is constrained to negotiate tariff reductions that leave unaltered its unfavorable terms of trade. In contrast, under an efficient and more flexible power-based approach, such as the Nash bargaining solution, by making non-tariff concessions to

[5] Mayer (1981) and Kennan and Riezman (1988) have shown that, in the presence of large country asymmetries, free trade is not in the core. This means that the stronger country's welfare is higher in the non-cooperative Nash equilibrium than in free trade.

its stronger trading partner, the weak country can induce it to give up its trade barriers and hence improve its terms of trade.

Our results may help explain why developing countries have often been so reluctant to actively participate to GATT negotiations, while being at the same time more and more willing to negotiate direct bilateral trade agreements with industrial countries (the so-called new regionalism), which often involve non-tariff concessions on the part of developing countries in exchange for tariff-free access to the market of their more developed trading partners.[6]

As noted earlier, our analysis builds on Bagwell and Staiger's economic theory of GATT. Unlike these authors, however, we do not allow for political motivations in our representation of government preferences, hence we stick with the traditional case in which governments maximize national income.[7] Further, in order to gain intuition on the effects of the GATT's rule of reciprocity in the presence of asymmetric countries, we implement their approach in the context of a specific trade model. In particular, we use the same pure exchange general equilibrium trade model as in Kennan and Riezman (1988), since it proves tractable for our purposes and amenable to analytical results. Our paper also shares important resemblances to Park (2000). This author, too, analyzes the outcome of trade negotiations among asymmetric countries under different environments. He shows, in particular, that although negotiating a tariff pair on the efficiency frontier or negotiating free trade plus a direct transfer from the small to the large country are equivalent in a static game, issues of enforcement imply that the latter arrangement is preferable from the standpoint of small countries.[8] Although Park's approach is different from ours, both papers provide, from different perspectives, an explanation for why weak countries increasingly prefer to negotiate free trade

[6] In recent North-South free trade agreements, such as the NAFTA or the Eastward enlargement of the EU, the main non-tariff concessions on the part of developing countries have involved liberalizing foreign direct investment, enforcing stricter intellectual property rights, raising environmental standards and, more generally, agreeing to change laws and regulations concerning various aspects of their internal economy. See also Park (2000) and Perroni and Whalley (1994) on this point.

[7] As emphasized in BS96 (p.3), political motivations are important in shaping the efficiency frontier of governments, but they play no role in explaining the logic of reciprocal trade liberalization. Hence, for simplicity, we only consider the traditional case in which governments maximize national income, which implies that free trade rests on the efficiency frontier. See Staiger and Tabellini (1987) and Maggi and Rodriguez-Clare (1998) for an investigation of the political motivations for trade agreements.

[8] As in BS99, we abstract from the issue of enforcement in this paper. See Maggi (1999) for an analysis of the role that the WTO can play in facilitating multilateral enforcement efforts. See also Bond and Park (2003) on how gradualism in trade agreements can help cooperation among asymmetric countries in a repeated tariff-setting game.

in exchange for non-tariff concessions rather than tariff concessions with their stronger trading partners.

The paper is organized as follows. Section 2 describes the analytical setup. Section 3 investigates the effects of trade liberalization according to the GATT's rule of reciprocity among asymmetric countries. Section 4 compares the outcome of a rules-based approach that conforms to reciprocity to the outcome of a power-based approach. Section 5 concludes.

2 Setup

The basic setup is as in Kennan and Riezman (1988; henceforth KR). Consider a world of pure exchange in which there are two countries, Home and Foreign, and two goods, X and Y. Variables related to Foreign will be denoted by capital letters. The two countries share the same Cobb-Douglas preferences, in which the two goods are weighted equally:

$$u = c_x c_y \qquad U = C_X C_Y \tag{1}$$

where c and C denote consumption. As in KR, the world endowment of each good is normalized to one, so the world distribution of endowments (x, X, y, Y) can be summarized by two parameters only, γ and μ:

$$x = \gamma;\ y = 1 - \mu;\ X = 1 - \gamma;\ Y = \mu$$

In this model, each country's autarchic price ratio equals the price ratio at which consumers choose to consume its endowment. In particular, preferences as in (1) imply that the autarchic relative price of X equals $\left(\frac{x}{y}\right)^{-1} = \left(\frac{\gamma}{1-\mu}\right)^{-1}$ in Home, and $\left(\frac{X}{Y}\right)^{-1} = \left(\frac{1-\gamma}{\mu}\right)^{-1}$ in Foreign. We assume

that Home has a comparative advantage in X, which implies that $\frac{\gamma}{1-\mu} > \frac{1-\gamma}{\mu}$, and hence:

$$\gamma + \mu > 1 \tag{2}$$

As noted by McLaren (1997, p. 410), a country's relative endowment of the comparative advantage good is an index of its trade dependence (and the reciprocal is an index of its trade independence) since, ceteris paribus, the greater the ratio, the greater the gains from *free* trade. Hence, $\frac{\gamma}{1-\mu}$ and $\frac{\mu}{1-\gamma}$ are Home and Foreign's indexes of trade dependence, respectively. Also, their ratio:

$$RTD = \frac{\gamma}{1-\mu} / \frac{\mu}{1-\gamma} = \frac{\gamma(1-\gamma)}{\mu(1-\mu)} > 1 \tag{3}$$

is an index of Home's *relative* trade dependence (or of Foreign's relative trade independence). Without loss of generality, we assume $RTD > 1$, namely, that Home is more trade dependent than Foreign. This ratio will turn out to be crucial for our results, since it determines a country's ability to manipulate its terms of trade through a tariff and hence the terms of trade prevailing at the non-cooperative Nash equilibrium.

Home charges a tariff at the rate $(S-1)$ on imports of Y, and Foreign charges a tariff at the rate $(T-1)$ on imports of X. Utility maximization subject to the budget constraint allows to derive the two countries' offer curves (see the appendix):

$$\frac{\gamma}{e_x} = \frac{S(1-\mu)}{i_y} + S + 1 \tag{4}$$

$$\frac{\mu}{E_Y} = \frac{T(1-\gamma)}{I_X} + T + 1 \tag{5}$$

where e_x $(= I_X)$ denotes Home exports (equal to Foreign imports) of X and i_y $(= E_Y)$ denotes

Home imports (equal to Foreign exports) of Y. Solving for e_y and i_y gives:

$$e_x = I_X = \frac{\mu\gamma - ST(1-\mu)(1-\gamma)}{S + ST(1-\mu) + \mu} \tag{6}$$

$$i_y = E_Y = \frac{\mu\gamma - ST(1-\mu)(1-\gamma)}{T + ST(1-\gamma) + \gamma} \tag{7}$$

Using (6) and (7), the two countries' equilibrium consumption levels are:

$$c_x = x - e_x = \frac{\gamma + T(1-\mu)}{1 + T(1-\mu) + \mu/S}; \quad c_y = y + i_y = \frac{\gamma + T(1-\mu)}{T + TS(1-\gamma) + \gamma} \tag{8}$$

$$C_X = X + I_X = \frac{\mu + S(1-\gamma)}{S + ST(1-\mu) + \mu}; \quad C_Y = Y - E_Y = \frac{\mu + S(1-\gamma)}{1 + S(1-\gamma) + \gamma/T} \tag{9}$$

Substituting (8) and (9) into (1) gives utility as a function of endowments and tariff rates:

$$u = c_x c_y = \frac{[\gamma + T(1-\mu)]^2}{[1 + T(1-\mu) + \mu/S]\,[T + TS(1-\gamma) + \gamma]} \tag{10}$$

$$U = C_X C_Y = \frac{[\mu + S(1-\gamma)]^2}{[S + TS(1-\mu) + \mu]\,[1 + S(1-\gamma) + \gamma/T]} \tag{11}$$

In the following, (10) and (11) will be used to compare welfare under different trade regimes. First note that, under free trade, $S = T = 1$, so the utility levels (u^F and U^F) are:

$$u^F = \frac{(\gamma + 1 - \mu)^2}{4}; \quad U^F = \frac{(\mu + 1 - \gamma)^2}{4} \tag{12}$$

Further, as shown by KR (see also the appendix), this model admits an explicit solution for the Nash equilibrium tariffs (S^N and T^N):

$$S^N = \left(\frac{\mu}{1-\gamma}\right)^{1/2}; \quad T^N = \left(\frac{\gamma}{1-\mu}\right)^{1/2} \tag{13}$$

Finally (see the appendix), the world relative price of X in the Nash equilibrium, P^N, is:

$$P^N = \frac{S^N}{T^N} = \left[\frac{\mu(1-\mu)}{\gamma(1-\gamma)}\right]^{1/2} = \left[\frac{1}{RTD}\right]^{1/2} \tag{14}$$

where the latter equality follows from (3). Note that, since the world relative price of X equals 1 in free trade[9], it follows that terms of trade are undistorted in the non-cooperative Nash equilibrium for $RTD = 1$, namely, when the two countries are perfectly symmetric. More generally, however, the greater is the relative trade dependence of Home, the lower (and the more distorted against it relative to the free trade) are Home's terms of trade in the Nash equilibrium.

Substituting (13) into (10) and (11) gives the Nash equilibrium utility levels (u^N and U^N):

$$\begin{aligned} u^N &= \frac{\left[\gamma + (\gamma(1-\mu))^{1/2}\right]^2}{\left[1 + (\gamma(1-\mu))^{1/2} + (\mu(1-\gamma))^{1/2}\right]\left[\gamma + \left(1 + (\mu(1-\gamma))^{1/2}\right)\left(\frac{\gamma}{1-\mu}\right)^{1/2}\right]} \\ U^N &= \frac{\left[\mu + (\mu(1-\gamma))^{1/2}\right]^2}{\left[1 + (\gamma(1-\mu))^{1/2} + (\mu(1-\gamma))^{1/2}\right]\left[\mu + \left(1 + (\gamma(1-\mu))^{1/2}\right)\left(\frac{\mu}{1-\gamma}\right)^{1/2}\right]} \end{aligned} \tag{15}$$

Next, we use this setup to analyze the negotiated outcome which conforms to the GATT's rule of reciprocity.

3 Trade Liberalization According to Reciprocity

As noted earlier, reciprocity refers to mutual tariff cuts that bring about roughly equal changes in import volumes across trading partners. A key observation of BS99 (p.224) is that, as long as changes in import volumes are measured at existing world prices, mutual changes in trade policy

[9] The free trade relative price of X, P^F, equals the price at which consumers choose to consume the world endowment. Given preferences as in (1), it follows that $P^F = \left(\frac{x+X}{y+Y}\right)^{-1} = 1$.

that conform to reciprocity leave the relative world price unchanged.[10] Hence, we have:

$$P^W(S,T) = P^N \tag{16}$$

where $P^W(S,T)$ is the world relative price of X. Equation (16) describes the Nash iso-world-price locus, i.e., the locus of all combinations of S and T that leave the world price ratio at the Nash equilibrium level. Beginning at the Nash equilibrium, equation (16) describes the mutual adjustments in tariffs consistent with a fixed world price ratio, and hence the liberalization path implied by reciprocity.

In order to derive an explicit expression for the iso-world-price locus, note that the trade balance condition implies: $P^W e_x = i_y$. Using equations (6) and (7) and substituting into equation (16), we obtain:

$$P^N = \frac{S + \mu + ST(1-\mu)}{T + \gamma + ST(1-\gamma)} \tag{17}$$

Equation (17) describes a positive (and convex) relation between S and T, as illustrated by the $P^N P^N$ curve in Figure 1. $N = (S^N, T^N)$ is the Nash equilibrium tariff pair, through which we have drawn the indifference curves corresponding to the Nash equilibrium utility levels, u^N and U^N. The liberalization path which conforms to reciprocity involves a downward movement along the $P^N P^N$ curve, as indicated by the arrows. The process of liberalization stops at the point where the mutual benefits from further tariff cuts terminate. In order to derive this point explicitly, we need to calculate the tariff pair that maximizes each country's welfare along the Nash iso-world-price curve, since it also represents the maximum degree of trade liberalization that each country is willing to achieve according to reciprocity.

[10] This observation allows BS to demonstrate that reciprocity can be efficiency enhancing. The key insight of BS is the following. As is well known, unilateral tariff setting is inefficient because governments do not bear the full consequences of their tariff choice, since part of the cost of a tariff increase is shifted to foreign exporters whose products sell at a lower world price. Hence, there is a negative terms-of-trade externality in tariff setting that induces governments to impose tariffs that are higher than would be efficient. However, since trade liberalization according to reciprocity leaves world prices unchanged, it neutralizes the terms-of-trade externality induced by unilateral tariff setting and so allows governments to agree on mutually beneficial tariff cuts.

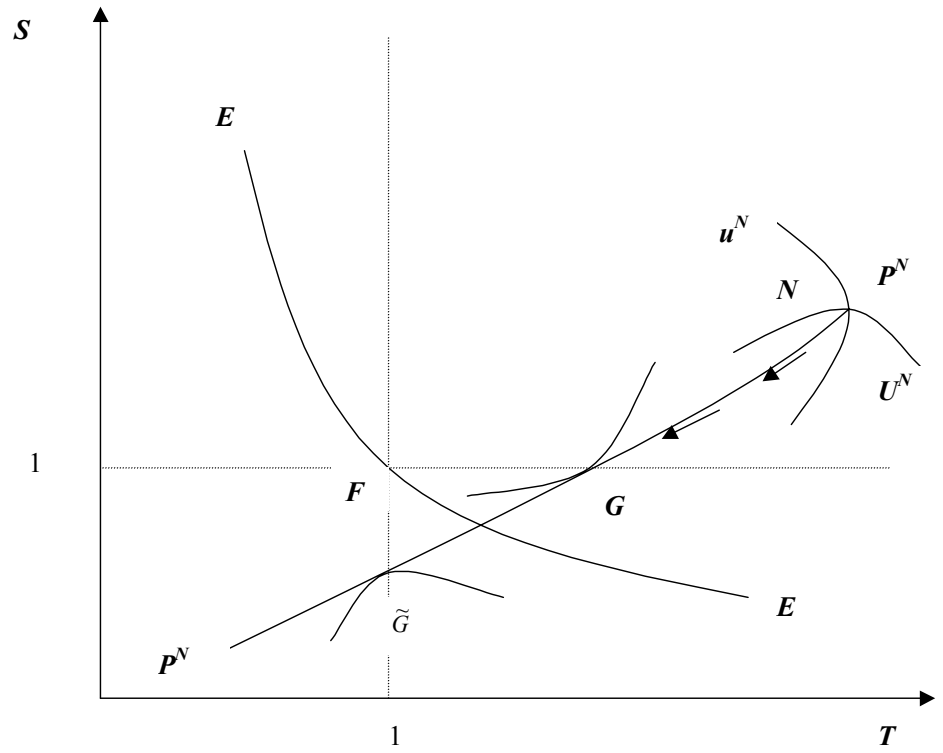

Figure 1: Liberalization according to reciprocity

As far as Home is concerned, solve (17) for T to obtain:

$$T = \frac{S + \mu - P^N \gamma}{P^N(1 + S(1-\gamma)) - S(1-\mu)} \tag{18}$$

Then, substitute (18) into (10) to obtain:

$$u = \frac{\left(1 - \mu + P^N \gamma\right)^2 S}{P^N \left(1 + S\right)^2} \tag{19}$$

It is straightforward to see, from (19), that u is a globally concave function of S and that it reaches a maximum for $S = 1$. Hence, the tariff pair that maximizes Home's welfare according to

reciprocity is:

$$S^G = 1; \quad T^G = \frac{1 + \mu - P^N \gamma}{P^N(2 - \gamma) - (1 - \mu)} \tag{20}$$

where T^G is implied by (18) for $S = 1$. It is straightforward to show that $T^G > 1$ for $P^N < 1$. Recall, from (14), that $P^N < 1$ if and only if Home is relatively trade dependent ($RTD > 1$). Hence, the agreement that maximizes Home's welfare under reciprocity is characterized by no restrictions on imports from Foreign ($S^G = 1$) in exchange for lower (relative to the Nash equilibrium) but still positive tariff barriers on its exports to Foreign ($T^G > 1$).

Similarly, to derive the maximum degree of trade liberalization that Foreign is willing to achieve according to reciprocity, solve (17) for S to obtain:

$$S = \frac{\mu - P^N(T + \gamma)}{P^N T(1 - \gamma) - 1 - T(1 - \mu)} \tag{21}$$

Then, substitute (21) into (11) to obtain:

$$U = \frac{\left[P^N(1 - \gamma) + \mu\right]^2 T}{P^N(1 + T)^2} \tag{22}$$

Note, from (22), that U is a globally concave function of T reaching a maximum for $T = 1$. Hence, the tariff pair that maximizes Foreign's welfare is:

$$\widetilde{T}^G = 1; \quad \widetilde{S}^G = \frac{\mu - P^N(1 + \gamma)}{P^N(1 - \gamma) - 2 + \mu} \tag{23}$$

where $\widetilde{S}^G$ is implied by (21) for $T = 1$. It is straightforward to show that $\widetilde{S}^G < 1$ for $P^N < 1$. Hence, since Foreign is relatively trade *independent*, the agreement that maximizes its welfare under reciprocity is characterized by no restrictions on imports from Home ($\widetilde{T}^G = 1$) in exchange for subsidized exports to Home ($\widetilde{S}^G < 1$).

The tariff pairs $G = (S^G, T^G)$ and $\widetilde{G} = (\widetilde{S}^G, \widetilde{T}^G)$ are illustrated in Figure 1. Note that, from

N to G, both countries benefit from mutual tariff concessions that conform to reciprocity. At G, however, the mutual benefits from tariff cuts are terminated, since at this point Home maximizes its welfare on the Nash iso-world-price locus. Hence, in contrast to Foreign, whose welfare increases monotonically from G to $\widetilde{G}$, Home is not willing to liberalize beyond G, which therefore represents the trade agreement among asymmetric countries that conforms to the GATT's rule of reciprocity (henceforth, we will refer to G as the GATT equilibrium).

A striking feature of the GATT equilibrium is that, although the more trade dependent country (Home) is, by definition, the country that benefits more from free trade, it is also the one that stops first the process of trade liberalization within the GATT. The intuition for this result is that, although the trade dependent country has potentially a lot to gain from trade liberalization, liberalizing according to reciprocity is unappealing to it because such a liberalization is implemented at the unfavorable Nash equilibrium terms of trade.

Note also, from (20) and (23), that $\frac{\partial T^G}{-\partial P^N} > 0$ and $\frac{\partial \widetilde{S}^G}{-\partial P^N} < 0$. This means that, the greater the relative trade dependence of Home (i.e., the lower P^N), the greater T^G and the lower $\widetilde{S}^G$. In terms of Figure 1, in the presence of greater country asymmetries, the $P^N P^N$ locus shifts to the right, implying a greater distance between G and $\widetilde{G}$. Hence, the greater the country asymmetries, the greater the reluctance of the more trade dependent country to liberalize according to reciprocity relative to its trading partner.

We can now evaluate welfare at the GATT equilibrium. Substituting (20) into (19) and (22) gives the two countries' utility at point G:

$$\begin{aligned} u^G &= \frac{\left(1-\mu+P^N\gamma\right)^2}{4P^N} \\ U^G &= \frac{\left[(2-\gamma)P^N-1+\mu\right]\left[1-\gamma P^N+\mu\right]}{4P^N} \end{aligned} \tag{24}$$

By comparing (24) to (12), it is immediate to see that, for $P^N = 1$, $u^G = u^F$ and $U^G = U^F$. Hence, the GATT's rule of reciprocity leads to the free trade outcome when the two countries are

perfectly symmetric.[11] This special case is the main focus of BS99's analysis.

Matters are quite different, however, in the more general case of asymmetric countries. Note, in particular, that $\frac{\partial u^G}{-\partial P^N} < 0$ and $\frac{\partial U^G}{-\partial P^N} > 0$, which implies that $u^G < u^F$ and $U^G > U^F$ for $P^N < 1$. Hence, a striking implication of the GATT's rule of reciprocity is that it allows the trade independent country (Foreign) to reach a welfare level greater than in free trade. In contrast, the trade dependent country (Home) cannot reach the free trade utility level under the GATT's rule of reciprocity.

The intuition behind this result is clear from Figure 1. By comparing the GATT equilibrium (G) to the free trade point at $F = (1, 1)$, note that at G, in addition to attaining tariff-free access to the Home market ($S^G = 1$), Foreign charges a positive tariff on imports from Home ($T^G > 1$), and this increases its welfare beyond the free trade level. The positive tariff levied by Foreign also explains why Home cannot reach the free trade utility level in the GATT equilibrium.

To sum up, we have shown that when asymmetric countries engage in trade negotiations that conform to the GATT's rule of reciprocity: (1) the more trade dependent country terminates negotiations first; (2) the greater are the country asymmetries, the more reluctant is the weaker country to liberalize relative to its trading partner; (3) the weaker country cannot reach the free trade welfare level; 4) the stronger country attains a higher welfare level than in free trade.

In order to put this last result in perspective, note that, as shown by Mayer (1981) and Kennan and Riezman (1988), in the presence of large country asymmetries free trade is not in core, which means that the stronger country can win a tariff war and hence its welfare is higher in the trade war than in free trade. Further, as shown by Bagwell and Staiger, liberalization according to reciprocity improves both countries' welfare relative to the trade war, since it partially removes the negative terms-of-trade externality. Hence, the received literature suggests that, with large country asymmetries, since the stronger country is better off in the trade war than in free trade ($U^N > U^F$), and it is better off in the GATT equilibrium than in the trade war ($U^G > U^N$), then

[11] Note, from (20), that $S^G = T^G = 1$ for $P^N = 1$.

it is better off in the GATT equilibrium than in free trade ($U^G > U^F$). Our result is surprisingly more general, however, since it does not depend on how large are country asymmetries. Put differently, even if free trade is in the core, so the stronger country is better off in free trade than in the Nash equilibrium ($U^F > U^N$), it is still true that this country is better off in the GATT equilibrium than in free trade.

The above analysis suggests that the GATT's rule of reciprocity, by allowing trade independent countries to improve their welfare relative to both the free trade and the trade war, may distort negotiated outcomes in favor of stronger countries. In fact, on the one hand, reciprocity allows these countries to 'dictate' the terms of trade at which tariff cuts must be implemented, an advantage that would be lost under free trade. On the other hand, thanks to the partial trade liberalization that reciprocity achieves, it also allows these countries to reduce distortions and hence increase welfare with respect to the trade war.

4 Rules versus Power in Negotiations among Asymmetric Countries

Following Jackson (1989, pp. 85-88), BS99 (p. 238) distinguish between a 'power-based' and a 'rules-based' approach to trade negotiations.[12] In the former, governments negotiate directly over tariffs without reference to any agreed-upon rules and the outcome of negotiations reflects the bargaining power of trading partners. In the latter, decisions are taken instead with reference to norms to which both parties have previously agreed. Negotiations within the GATT conform to a rules-based approach, since they are driven by commonly agreed rules. In contrast, the Nash bargaining solution represents a natural formalization of a power-based approach since, as noted by Bagwell and Staiger, any difference between its outcome and the free trade outcome simply reflects power asymmetries among trading partners. BS argue that a crucial merit of the GATT's

[12] See also BS00 on this point.

rule of reciprocity is that "it serves to mitigate the influence of power asymmetries on negotiated outcomes". As such, reciprocity should favor weak (trade dependent) countries relative to their stronger trading partners.

In this section, we challenge this view. To make the point, we compare the GATT equilibrium derived above with the outcome of a Nash bargaining. The Nash bargaining solution is the tariff pair that maximizes $(u - u^N)(U - U^N)$, where utility at the non-cooperative Nash equilibrium (the trade war) represents the threat point. Following McLaren (1997, p. 409), we do not solve this problem explicitly. A simpler indirect method of solution is sufficient for our purposes. In this respect, note that the negotiated outcome must be in the core, which means that it is Pareto efficient and that both countries must prefer it to the trade war. These conditions require that either the trade dependent country (Home) subsidizes Foreign's exports ($S < 1$), or the two countries agree on free trade with a side payment from Home to Foreign. In terms of Figure 1, where we have drawn the efficiency locus (the curve labeled EE)[13], the Nash bargaining solution is a point on the lower portion (FE) of the efficiency locus. In practice, however, as noted by Dixit (1987) and McLaren (1997), negative tariffs are difficult to implement, whereas there is a broad spectrum of forms in which the equivalent of a side payment can be made (see, for instance, the examples provided by McLaren, 1997 and Perroni and Whalley, 1994).

Using the formulation suggested by McLaren, in which bargaining leads to free trade plus a side payment M from Home to Foreign, the Nash bargaining solution maximizes

$$\left[u^F - \frac{M}{\left(P_X^W P_Y^W\right)^{1/2}} - u^N\right]\left[U^F + \frac{M}{\left(P_X^W P_Y^W\right)^{1/2}} - U^N\right] \tag{25}$$

where P_X^W and P_Y^W are the free trade world prices and $\frac{M}{\left(P_X^W P_Y^W\right)^{1/2}}$ is the transfer in terms of utils

[13] As first shown by Mayer (1981), $S = 1/T$ describes the efficiency locus in tariff-space, since these tariff pairs equalize the local price ratios.

from Home to Foreign. Maximizing (25) with respect to M yields:

$$\frac{M}{\left(P_X^W P_Y^W\right)^{1/2}} = \frac{1}{2}\left(u^F - u^N\right) - \frac{1}{2}(U^F - U^N) \tag{26}$$

Adding (26) to U^F and subtracting it from u^F gives utility in the Nash bargaining solution:

$$\begin{aligned} U^B &= \frac{1}{2}\left(u^F + U^F\right) + \frac{1}{2}(U^N - u^N) \\ u^B &= \frac{1}{2}\left(u^F + U^F\right) - \frac{1}{2}(U^N - u^N) \end{aligned} \tag{27}$$

Finally, using (12) and (15), we can express U^B as a function of the endowments γ and μ (a similar expression holds for u^B):

$$U^B = \frac{1+(\gamma-\mu)^2}{4} + \frac{1}{2\left[1+(\gamma(1-\mu))^{1/2}+(\mu(1-\gamma))^{1/2}\right]}\left(\frac{\left[\mu+(\mu(1-\gamma))^{1/2}\right]^2}{\left[\mu+\left(1+(\gamma(1-\mu))^{1/2}\right)\left(\frac{\mu}{1-\gamma}\right)^{1/2}\right]} - \frac{\left[\gamma+(\gamma(1-\mu))^{1/2}\right]^2}{\left[\gamma+\left(1+(\mu(1-\gamma))^{1/2}\right)\left(\frac{\gamma}{1-\mu}\right)^{1/2}\right]}\right) \tag{28}$$

Note that, although U^B is a complicated function of γ and μ, it can be easily interpreted numerically. We are interested, in particular, in the difference $(U^G - U^B)$ between utility under GATT's reciprocity rule and under the Nash bargaining solution, in the feasible range of γ and μ. In this respect, note that, since Home (Foreign) has a comparative advantage in X (Y) and is relatively trade dependent (independent), (2) and (3) hold, so we must simultaneously have that $\gamma + \mu > 1$ and $\frac{\gamma(1-\gamma)}{\mu(1-\mu)} > 1$. In the appendix, we show that (2) and (3) cannot hold simultaneously for $\mu < 1/2$. Conversely, for $\mu > 1/2$, (2) and (3) are both satisfied for $1-\mu < \gamma < \mu$. Hence, the feasible range of the endowments is:

$$\gamma \in (1-\mu, \mu), \quad \mu \in (1/2, 1) \tag{29}$$

Figure 2 plots the difference $(\frac{\gamma}{1-\mu} - \frac{\mu}{1-\gamma})$ between Home and Foreign's trade dependence as a function of γ for various values of μ in the feasible range of γ and μ. Note that, for given γ,

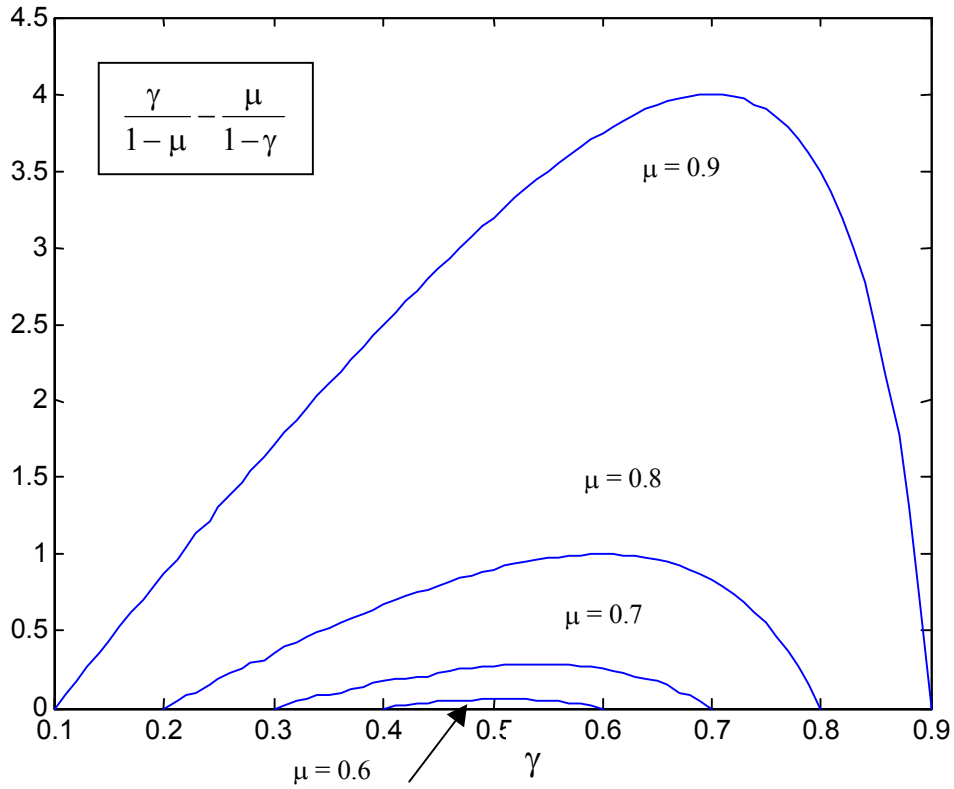

Figure 2: Difference between Home and Foreign's trade dependence as a function of endowments

$(\frac{\gamma}{1-\mu} - \frac{\mu}{1-\gamma})$ is higher for higher values of μ, and that, for given μ, the relation between γ and $(\frac{\gamma}{1-\mu} - \frac{\mu}{1-\gamma})$ is non-monotonic.

Similarly, Figure 3 plots $(U^G - U^B)$ as a function of γ for various values of μ in the feasible range of γ and μ. The most striking feature of Figure 3 is that $(U^G - U^B)$ is always greater than zero, which means that the trade independent country is always better off under GATT's reciprocity rule than under the Nash bargaining solution. Hence, notwithstanding the fact that in the Nash bargaining solution the stronger, trade independent country can exploit its greater bargaining power, it is worse off than under GATT's reciprocity rule. Note, also, that since the Nash bargaining solution is Pareto efficient, the above result also implies that $(u^G - u^B) < 0$, namely, that the weaker, trade dependent country is better off under a power-based approach to trade negotiations than under a rules-based approach that conforms to reciprocity. Finally,

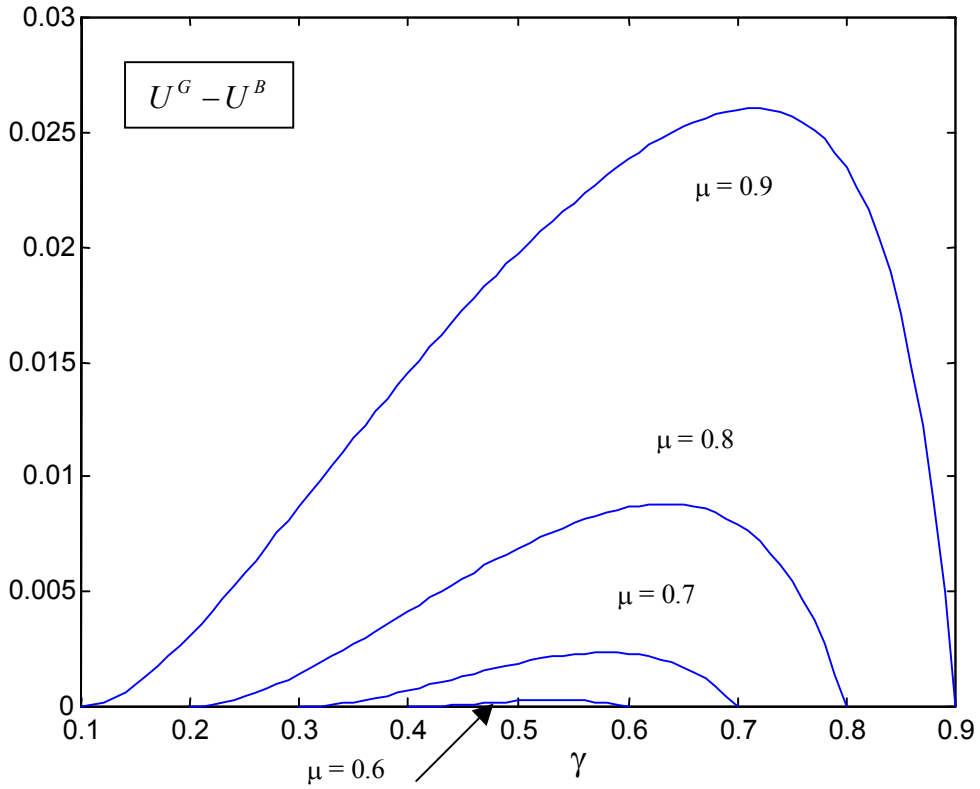

Figure 3: Reciprocity versus Nash bargaining

by comparing Figures 2 and 3 note that Foreign country's preference for reciprocity is greater the greater is the trade dependence of Home relative to Foreign, as measured by the absolute difference between Home and Foreign's trade dependence. Hence we conclude that, contrary to what claimed by Bagwell and Staiger, the GATT's rule of reciprocity may perversely exacerbate, rather than mitigating, power asymmetries among countries.

The intuition behind this paradoxical result is that a narrow application of reciprocity to tariff concessions makes it unappealing to the country less capable of manipulating the terms of trade through tariffs, since it cannot attain what it mainly wishes, namely, a tariff-free access to the market of its stronger trading partner. In contrast, under a flexible (and efficient) approach to trade negotiations, by means of non-tariff concessions (formally, a side payment) the weaker country can attain a tariff-free access to the market of its stronger trading partner.

5 Conclusions

Building on Bagwell and Staiger's 'GATT-Think' and on Kennan and Riezman (1988)'s pure exchange general equilibrium trade model, we have analyzed the welfare implications of GATT's reciprocity rule in the presence of asymmetric countries. As in McLaren (1987), we have focused, in particular, on asymmetries in power status stemming from differences in the relative trade dependence of trading partners. Our basic findings are the following. 1) Beginning at the non-cooperative Nash equilibrium, both countries gain from trade liberalization according to reciprocity, although the stronger, less trade dependent country gains disproportionately more. 2) Although the more trade dependent country is, by definition, the one that gains potentially more from trade liberalization, it is also the one that stops first the liberalization effort along the liberalization path that conforms to reciprocity. 3) Reciprocity is so unfavorable to the trade dependent country that it may be better off under the Nash bargaining solution (a power-based approach to trade negotiations that reflects power asymmetries among trading partners) than under GATT's reciprocity rule. 4) Reciprocity is so favorable to the trade independent country that it may be better off under this rule than under free trade or under the Nash bargaining solution. These results have led us to conclude that GATT's reciprocity rule may exacerbate power asymmetries among trading partners.

Our analysis helps to make sense of the often heard complaints on the part of developing countries concerning the fairness of the GATT-WTO. These countries, most of which have a production structure highly skewed toward agricultural and textile-leather-apparel products (which makes them highly trade dependent), often complain, first, that in industrial countries agricultural products are protected by average tariff rates that are 8 times higher than those of industrial products (besides all sorts of non-tariff barriers); second, that although average tariff rates for industrial products have been drastically reduced, remaining tariffs in manufacturing are concentrated in the textile-leather-apparel sectors.[14] Our analysis suggests that this outcome is an implication of the internal logic of reciprocal tariff concessions in the presence of asymmetric countries.

[14] See, for instance, Moore (2001) for a summary of the main requests by the developing countries to the WTO.

Our analysis can also shed light on the so-called new regionalism, i.e., the fact that developing countries increasingly seek to negotiate bilateral trade agreements with industrial countries. For instance, the NAFTA, or the Eastward enlargement of the EU are recent, successful, examples of this new trend in international relations, although, as shown by Baldwin (1997), efforts made by developing countries to negotiate FTAs with industrial countries have often been frustrated by the refusal opposed by the latter.[15] As emphasized by Park (2000) and Perroni and Whalley (1994), a distinguishing feature of the new regionalism is that the weaker country negotiates tariff-free access to the market of its trading partner in exchange for non-tariff concessions. In this respect, an important point made in this paper is that a trade dependent country can be better off under such a flexible and efficient approach to negotiations than under an approach based on reciprocal tariff cuts, whereas the stronger, trade independent country can be better off under the latter approach.

In closing, some important caveats are in order. First, our main results have been derived in the context of a specific (although quite popular) trade model. Hence, their general validity is yet to be proven and is a topic for further research. However, we believe that the mere *possibility* that a trade independent country be better off under GATT's reciprocity rule than under the Nash bargaining solution is an interesting result *per se*, since it suggests that GATT's reciprocity rule can highly distort negotiated outcomes in favor of stronger countries. Second, our analysis was not intended to show that the common practice of seeking a balance of concessions within the GATT-WTO is, by itself, detrimental to weaker countries. Rather, we have argued that a narrow application of reciprocity to tariff concessions makes it unappealing to the countries less capable of manipulating the terms of trade through tariffs, since they do not have much to reciprocate and hence cannot attain what they mainly wish, namely, a tariff-free access to the markets of their stronger trading partners. In contrast, extending the scope of reciprocity

[15] Baldwin (1997, p.871) argues that in the early nineties Chile, Brasil, Argentina Uruguay and Paraguay all formally or informally approached the US with requests for FTAs. The Bush administration refused to negotiate with these countries, and encouraged instead the creation of a free trade area among them. Hence, Mercosur was partly created by the Southern Cone countries in order to accomplish a pre-condition for subsequent talks with the US.

to include the possibility of non-tariff concessions by developing countries in exchange for tariff concessions by industrial countries (for instance, in agriculture or in the textile-apparel-leather sectors) could increase the range of mutually beneficial North-South trade agreements within the GATT-WTO. In this respect, the recent broadening of the WTO agenda to include negotiations on services, environmental standards, intellectual property rights and foreign direct investment may be considered an important step in the right direction. Finally, the GATT-WTO is much more than reciprocity, on which we have exclusively focused in this paper. In particular, the principle of non-discrimination has allowed developing countries to benefit from tariff cuts negotiated among industrial countries. Moreover, the Generalized System of Preferences (GSP) operated by industrial countries has further reduced the average tariff rates applicable to imports from least developed countries. However, as shown, *inter alia*, by Michalopoulos (1999, p. 48), the GSP and other preferential schemes have not helped enhance access of least developed countries' low-skill intensive exports to industrial countries' markets[16], which makes the issues analyzed in this paper still relevant.

6 Appendix

6.1 Offer curves

As for Home's offer curve, consumers maximize u (see equation (1)) subject to the following budget constraint:

$$P^W c_x + S c_y = P^W \gamma + S(1-\mu) + (S-1) i_y$$

where P^W is the world relative price of X and $(S-1)i_y$ is tariff revenue. Substituting $c_x = \gamma - e_x$ and $c_y = 1 - \mu + i_y$ into the budget constraint gives the trade balance condition: $P^W e_x = i_y$.

[16] The reason is that almost all products having tariff 'peaks' in developed countries are excluded from the preferential schemes. See also Cernat, Laird and Turrini (2002) for an analysis of the market access issues faced by developing countries.

With Cobb-Douglas preferences as in (1), in which the two goods are weighted equally, utility is maximized by allocating equal expenditures to each good: $P^W c_x = S c_y$. Substituting the expressions for c_x and c_y, the above can be written as:

$$P^W = \frac{S(1-\mu+i_y)}{\gamma - e_x} \tag{30}$$

Finally, plugging (30) into the trade balance condition gives Home's offer curve (equation (4) in main text).

Similarly, Foreign consumers maximize U subject to the budget constraint:

$$TP^W C_X + C_Y = TP^W(1-\gamma) + \mu + (T-1)I_X$$

Substituting $C_X = 1 - \gamma + I_X$ and $C_Y = \mu - E_Y$ into the budget constraint gives the trade balance condition: $P^W I_X = E_Y$. Utility is maximized by allocating equal expenditures to each good: $TP^W C_X = C_Y$. Using the expressions for C_X and C_Y, the above can be written as:

$$P^W = \frac{\mu - E_Y}{T(1-\gamma+I_X)} \tag{31}$$

Substituting (31) into the trade balance condition gives Foreign's offer curve (equation (5) in main text).

6.2 Nash equilibrium tariffs

When governments set tariffs unilaterally, each chooses a tariff that maximizes the utility of the representative consumer for given tariff choice by the other government. Hence, the Home government maximizes u (equation (10)) with respect to S, while the Foreign government maximizes U

(equation (11)) with respect to T . The first order conditions are, respectively:

$$\frac{(1-\gamma)}{1+S(1-\gamma)+\gamma/T} = \frac{\mu/S^2}{1+T(1-\mu)+\mu/S} \tag{32}$$

$$\frac{\gamma}{T+ST(1-\gamma)+\gamma} = \frac{T(1-\mu)}{1+T(1-\mu)+\mu/S} \tag{33}$$

Rearranging (32) and (33) gives Home and Foreign's tariff reaction functions:

$$S = \frac{1}{T}\left[\frac{\mu\gamma}{(1-\mu)(1-\gamma)}\right]^{1/2} \tag{34}$$

$$T = \left[\frac{\gamma(S+\mu)}{S(1-\mu)(1+S(1-\gamma))}\right]^{1/2} \tag{35}$$

Solving (34) and (35) for S and T gives the Nash equilibrium tariffs, S^N and T^N, as in equation (13).

Finally, substituting S^N and T^N into (6) and (7) and using the trade balance condition, $P^W e_x = I_X$, gives the relative price of X in the non-cooperative Nash equilibrium, P^N, as in equation (14).

6.3 Feasible range of γ and μ

First note that, for $x \in [0,1]$, the function $x(1-x)$ is an inverted parabola symmetric around $x = 1/2$, as shown in Figure 4. It follows that, for $\mu > 1/2$, $\gamma(1-\gamma) > \mu(1-\mu)$ requires that $1-\mu < \gamma < \mu$. Note that in this case the condition $\gamma + \mu > 1$ is also satisfied. In contrast, for $\mu < 1/2$, $\gamma(1-\gamma) > \mu(1-\mu)$ requires that $\mu < \gamma < 1-\mu$. In this latter case, however, the condition $\gamma + \mu > 1$ is not satisfied. Hence we conclude that our assumptions that Home has a comparative advantage in X (i.e., $\gamma + \mu > 1$) and that it is relatively trade dependent (i.e., $\frac{\gamma(1-\gamma)}{\mu(1-\mu)} > 1$) imply the restrictions on γ and μ given by equation (29) in the main text.

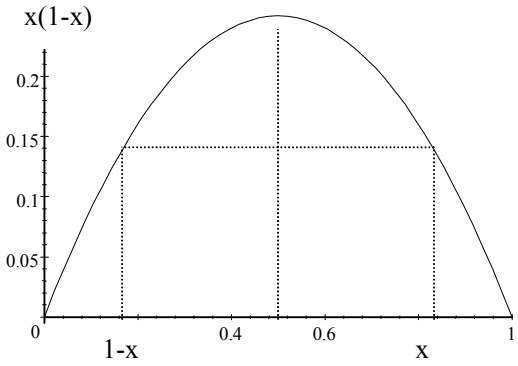

Figure 4: Parameter restrictions

References

[1] Bagwell, Kyle and Robert W. Staiger (1996). "Reciprocal Trade Liberalization," *NBER Working Paper* No. 5488.

[2] Bagwell, Kyle and Robert W. Staiger (1999). "An Economic Theory of GATT," *American Economic Review* 89 (1), 215-248.

[3] Bagwell, Kyle and Robert W. Staiger (2000). "GATT-Think," *NBER Working Paper* No. 8005

[4] Bagwell, Kyle and Robert W. Staiger (2001). "Reciprocity, Non-Discrimination and Preferential Agreements in the Multilateral Trading System," *European Journal of Political Economy* 17, 281-325.

[5] Baldwin, Richard (1997). "The Causes of Regionalism," *The World Economy* 20 (7), 865-888.

[6] Bond, Eric and Jee-Hyeong Park (2003). "Gradualism in Trade Agreements with Asymmetric Countries," forthcoming in *Review of Economic Studies.*

[7] Cernat, Lucian, Sam Laird and Alessandro Turrini (2002). *Back to Basics: Market Access Issues in the Doha Agenda*, United Nations Conference on Trade and Development, New York and Geneva.

[8] Dam, Kenneth W. (1970). *The GATT: Law and International Economic Organization*, University of Chicago Press, Chicago.

[9] Dixit, Avinash (1987). "Strategic Aspects of Trade Policy," in Truman Bewley ed., *Advances in Economic Theory: Papers Presented at the Fifth World Congress of the Econometric Society*, Cambridge University Press, Cambridge.

[10] Jackson, John H. (1989). *The World Trading System*, MIT Press, Cambridge MA.

[11] Kennan, John and Raymond Riezman (1988). "Do Big Countries Win Tariff Wars?," *International Economic Review* 29 (1), 81-85.

[12] Krugman, Paul (1991). "The Move Toward Free Trade Zones," in *Policy Implications of Trade and Currency Zones: A Symposium Sponsored by the Federal Reserve Bank of Kansas City*, Jackson Hole, WY.

[13] Maggi, Giovanni (1999). "The Role of Multilateral Institutions in International Trade Cooperation," *American Economic Review* 89 (1), 190-214.

[14] Maggi, Giovanni and Andres Rodriguez-Clare (1998). "The Value of Trade Agreements in the Presence of Political Pressures," *Journal of Political Economy* 106 (3), 574-601.

[15] Mayer, Wolfgang (1981). "Theoretical Considerations on Negotiated Tariff Adjustments," *Oxford Economic Papers* 33, 135-153.

[16] McLaren, John (1997). "Size, Sunk Costs, and Judge Bowker's Objection to Free Trade," *American Economic Review* 87 (3), 400-420.

[17] Michalopoulos, Constantine (1999). "Trade Policy and Market Access Issues for Developing Countries," *World Bank Policy Research Working Paper* No. 2214.

[18] Moore, Mike (2001). "The WTO and Developing Countries: Priorities for Negotiations," speech to the German Foundation for International Development, Berlin, April 23.

[19] Park, Jee-Hyeong (2000). "International Trade Agreements between Countries of Asymmetric Size," *Journal of International Economics* 50, 473-495.

[20] Perroni, Carlo and John Whalley (1994). "The New Regionalism: Trade Liberalization or Insurance?," *NBER Working Paper* No. 4626.

[21] Staiger, Robert and Guido Tabellini (1987). "Discretionary Trade Policy and Excessive Protection," *American Economic Review* 77(5), 823-837.